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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/965,400	09/27/2001	Victor Adut	CS11145	3803

20280 7590 11/19/2004

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EXAMINER	
SKED, MATTHEW J	
ART UNIT	**PAPER NUMBER**
2655	

DATE MAILED: 11/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)
	09/965,400	ADUT, VICTOR
	Examiner	Art Unit
	Matthew J Sked	2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 27 September 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 9/27/01, 1/13/03.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

2. The disclosure is objected to because of the following informalities: The inventor did not submit a summary for the application.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 5, 7, 9-11, 15, 18, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rothweiler et al. (U.S. Pat. 5,668,925) in view of Nishiguchi et al. (U.S. Pat. 6,047,253), cited by the applicant..

As per claim 1, Rothweiler teaches a method of coding speech comprising the steps of:

sampling a speech signal (A/D converter, Fig. 1, element 14);

determining a pitch of the speech signal (pitch epoch detector, col. 8, lines 11-13);

characterizing the voiced quality of the speech signal (determination of the signal being voiced or unvoiced, col. 9, lines 62-67 and col. 10, lines 8-12);

implied training a Lloyd-Max quantizer (col. 13, lines 30-32); and

quantizing the pitch values (pitch quantized by differential quantizer, col. 17, lines 37-47) from the training step and the pitch values of those speech signals from the determining step not characterized as being substantially fully voiced in the characterizing step (determines the pitch for all voice segments hence the averaging would take into account all voiced and unvoiced segments, col. 10, lines 23-36).

Rothweiler does not teach training the Lloyd-Max quantizer using the pitch values of those speech signals from the determining step characterized as being substantially fully voiced in the characterizing step.

However, the Examiner takes Official Notice that it is common in the art to train a quantizer on the type of data that it would quantize and that unvoiced speech segments do not carry any pitch information. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler to train the Lloyd-Max quantizer using the pitch values of those speech signals from the determining step characterized as being substantially fully voiced in the characterizing step because it would give a method for quantizing the meaningful pitch value with a low error rate, hence improving decoded pitch value accuracy.

Rothweiler does not teach speech coding using perceptual weighting.

Nishiguchi teaches the speech coder using perceptual weighting (perceptually weighted filter, Fig. 1, element 125).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler so that the speech coder uses perceptual weighting as taught by Nishiguchi because it would lower the quantization noise below the level of human perception hence making the system more robust.

5. As per claim 5, Rothweiler teaches the sampling step does not use error correction (does not mention use of error correction in sampling, col. 6, lines 45-62, or anywhere else).

6. As per claim 7, Rothweiler teaches storing the quantized pitch values in a memory for later decoding, synthesis and playback (encoded pitch signal sent to buffer, col. 17, lines 45-47).

7. As per claim 9, Rothweiler teaches

determining a gain of the speech signal (signal power, col. 7, lines 26-30 and col. 13, line 13),

the implied training step includes training a Lloyd-Max quantizer with the gain values (gain quantizer uses Lloyd-max algorithm, Fig. 3 and col. 13, lines 30-32), and

the quantizing step includes quantizing the gain values from the implied training step and the gain values of those speech signals from the determining step not characterized as being substantially fully voiced in the characterizing step.(all frames are quantized, col. 13, lines 39-51).

Rothweiler does not teach training the quantizer with speech signals from the determining step characterized as being substantially fully voiced in the characterizing step.

However, the Examiner takes Official Notice that using only voiced speech signals in training for gain quantization is common in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler to train training the quantizer with speech signals from the determining step characterized as being substantially fully voiced in the characterizing step because it would be more important to get the gain right for voiced portions to avoid "zipper noise" due to volume variations.

8. As per claims 10 and 19, Rothweiler teaches the fully voiced speech signal is synthesized using a pitch periodic excitation train (periodic signals are generated by a pitch generator and supplied to the filter, col. 19, lines 2-8).

Rothweiler does not teach that the speech that is not fully voiced is synthesized using a lowpass filtered pitch periodic excitation signal mixed with highpass white noise.

Nishiguchi teaches a method for synthesizing speech that mixes a lowpass filtered pitch periodic excitation signal (voiced sound filtered by post-filter, col. 10, lines 40-44) with a highpass white noise (unvoiced section filters noise codebook vectors to combine with the pitch excitation train (Fig. 4, element 220). .

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler so that speech that is not fully voiced is synthesized using a lowpass filtered pitch periodic excitation signal mixed with highpass white noise as taught by Nishiguchi because partially voiced speech would need the combination of a periodic pulse train and noise to reconstruct the signal accurately.

9. As per claims 11 and 20, Rothweiler teaches pitch periodic excitation trains with substantially flat spectral response (the pitch pulse train excitating pulse width would tend to be short so that its spectral response would tend to be flat, col. 19, lines 3-8).

10. As per claim 15, Rothweiler teaches an apparatus for coding speech comprising:

a buffer, the buffer inputs a speech signal and stores samples thereof (sampler would necessarily have a buffer, col. 7, lines 9-17);

a pitch detector coupled to the buffer, the pitch detector determines a pitch of the speech signal (pitch of the signal, col. 10, lines 23-25);

a voicing analyzer coupled to the pitch detector; the voicing analyzer characterizes the speech signal as to whether it is substantially fully voiced (determination of the signal being voiced or unvoiced, col. 9, lines 62-67 and col. 10, lines 8-12); and

a Lloyd-Max quantizer that is necessarily trained with the input speech signal (col. 13, lines 30-32), the quantizer also quantizes the pitch values of those speech signals from the pitch detector not characterized as being substantially fully voiced (determines the pitch for all voice segments would take into account all voiced and unvoiced segments, col. 10, lines 23-36).

Rothweiler does not teach training the Lloyd-Max quantizer using the pitch values of those speech signals from the determining step characterized as being substantially fully voiced in the characterizing step.

However, the Examiner takes Official Notice that it is common in the art to train a quantizer on the type of data that it would quantize and that unvoiced speech segments

do not carry any pitch information. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler to train the Lloyd-Max quantizer using the pitch values of those speech signals from the determining step characterized as being substantially fully voiced in the characterizing step because it would give a method for quantizing the meaningful pitch value with a low error rate, hence improving decoded pitch value accuracy.

Rothweiler does not teach speech coding using perceptual weighting.

Nishiguchi teaches the speech coder using perceptual weighting (perceptually weighted filter, Fig. 1, element 125).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler so that the speech coder uses perceptual weighting as taught by Nishiguchi because it would lower the quantization noise below the level of human perception hence making the system more robust.

11. As per claim 18, Rothweiler teaches

A gain detector coupled between the buffer and quantizer (half frame power block, Fig. 2a, element 216),

a Lloyd-Max quantizer is trained with the gain values (gain quantizer uses Lloyd-max algorithm for implied training, col. 13, lines 30-32), and

the quantizer also quantizes the gain values from the training step and the gain values of those speech signals from the determining step not characterized as being substantially fully voiced in the characterizing step.(all frames are quantized, col. 13, lines 39-51).

Rothweiler does not teach training the quantizer with speech signals from the determining step characterized as being substantially fully voiced in the characterizing step.

However, the Examiner takes Official Notice that using only voiced speech signals in training for gain quantization is common in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler to train training the quantizer with speech signals from the determining step characterized as being substantially fully voiced in the characterizing step because it would be more important to get the gain right for voiced portions to avoid "zipper noise" due to volume variations.

12. Claims 2 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rothweiler in view of Satyamurti et al. (U.S. Pat. 5,699,404).

Rothweiler teaches that the errors include pitch doubling, a common error found in pitch estimation (col. 1, lines 45-47), but teaches pitch averaging rather than median filtering the pitch values of those speech signals characterized as being substantially fully voiced in the characterizing step, thereby removing these pitch-doubling errors.

Satyamurti teaches median filtering the pitch values of those speech signals characterized as being substantially fully voiced in the characterizing step, thereby necessarily removing pitch doubling errors (pitch values found from voiced speech blocks and are median filtered to eliminate errors, col. 3, lines 11-20).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the averaging system of Rothweiler to median filtering of the pitch

values of those speech signals characterized as being substantially fully voiced in the characterizing step, for removing pitch doubling errors as taught by Satyamurti because pitch doubling errors would cause greater error in arithmetic mean than in a median and this filtering would reduce the amount of pitch error.

13. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rothweiler in view of Nishiguchi '253 and in further view of Nishiguchi et al. (U.S. Pat. 5,960,388).

As per claim 3, Rothweiler teaches dividing the speech signal into a plurality of frequency spectrum bands (filter bank, col. 10, lines 37-40).

Rothweiler and Nishiguchi '253 do not teach establishing the voiced quality of the speech signal in each spectrum band, and describing the speech signal as being substantially fully voiced if a majority of the plurality spectrum bands are established to be of a speech signal of a voiced quality.

Neither Rothweiler nor Nishiguchi '253 teach describing the speech signal as being substantially fully voiced if a majority of the plurality spectrum bands are established to be of a speech signal of a voiced quality.

Nishiguchi '388 teaches establishing the voiced quality of the speech signal in each spectrum band (voiced and unvoiced portions are present in each frequency band, col. 6, lines 7-14), and describing the speech signal as being voiced by counting the bands that are voiced and making the comparison between the voiced bands and the unvoiced bands (ratio, col. 28, lines 54-63).

However, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler and Nishiguchi '253 to describe the speech signal as being substantially fully voiced if a majority of the plurality spectrum bands are established to be of a speech signal of a voiced quality because this would simplify the coding.

14. As per claim 4, neither Rothweiler nor Nishiguchi '253 teach the dividing step includes five spectrum bands.

Nishiguchi '388 teaches at least 11 bands (Fig. 7A), thus including five.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include five (or more) spectrum bands because it would enable more accurate perceptual coding by better approximating the ear's critical bands.

15. Claims 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rothweiler in view of Nishiguchi '253 and in further view of Simpson et al. (U.S. Pat. 6,772,126).

Rothweiler teaches buffering the speech signal for a multiple of frames to be block quantized in subsequent steps (quantizer quantizes the signal after a three frame delay, col. 17, lines 37-40).

Neither Rothweiler nor Nishiguchi teach the number of buffered frames of speech is increased during periods of substantially voiced speech to enable more accurate coding during the subsequent steps.

Simpson teaches buffering the speech signal for a multiple of frames to be block quantized in subsequent steps (pitch is quantized in blocks of four pitch values, col. 41,

lines 19-20), wherein the number of buffered frames of speech is increased during periods of substantially voiced speech to enable more accurate coding during the subsequent steps (pitch values buffered only for voiced frames, hence the number of buffered frames is necessarily increased, col. 41, lines 20-25).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler and Nishiguchi so that the number of buffered frames of speech is increased during periods of substantially voiced speech as taught by Simpson because vector quantization would achieve a lower bit rate for voiced frames compared to a scalar quantization, hence being more efficient.

16. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rothweiler in view of Nishiguchi '253 and in further view of Scott et al. (U.S. Pat. 4,969,193).

Rothweiler teaches quantizing using three bits per pitch value (col. 17, lines 41-45), but does not teach quantizing using two bits per pitch value. Neither does Nishiguchi.

Scott teaches quantizing using two bits per pitch value (col. 9, lines 26-31).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler and Nishiguchi to quantize using two bits per pitch value as taught by Scott because it would lower the amount of bits used to represent the pitch information hence lowering the bit rate and making the system more efficient.

17. Claims 12 and13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rothweiler in view of Simpson and in further view of Nishiguchi '253.

As per claim 12, Rothweiler teaches a method of coding speech comprising the steps of:

sampling a speech signal (A/D converter, Fig. 1, element 14);

buffering the speech signal for a multiple of frames to be block quantized in subsequent steps (quantizer quantizes the signal after a three frame delay, col. 17, lines 37-40);

determining a pitch of the speech signal (average pitch of the signal, col. 10, lines 23-26);

characterizing the voiced quality of the speech signal (determination of the signal being voiced or unvoiced, col. 9, lines 62-67 and col. 10, lines 1-9);

implied training of a Lloyd-Max quantizer (col. 13, lines 30-32);

quantizing the pitch values (pitch quantized by differential quantizer, col. 17, lines 37-47) from the training step and the pitch values of those speech signals from the determining step not characterized as being substantially fully voiced in the characterizing step (determines the pitch for all voice segments hence the averaging would take into account all voiced and unvoiced segments, col. 10, lines 23-36); and

the fully voiced speech signal is synthesized using a pitch periodic excitation train (periodic signals are generated by a pitch generator and supplied to the filter, col. 19, lines 2-8).

Rothweiler does not teach training the Lloyd-Max quantizer using the pitch values of those speech signals from the determining step characterized as being substantially fully voiced in the characterizing step.

However, the Examiner takes Official Notice that it is common in the art to train a quantizer on the type of data that it would quantize and that unvoiced speech segments do not carry any pitch information. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler to train the Lloyd-Max quantizer using the pitch values of those speech signals from the determining step characterized as being substantially fully voiced in the characterizing step because it would give a method for quantizing the meaningful pitch value with a low error rate, hence improving decoded pitch value accuracy.

Rothweiler does not teach the number of buffered frames of speech is increased during periods of substantially voiced speech to enable more accurate coding during the subsequent steps.

Simpson teaches buffering the speech signal for a multiple of frames to be block quantized in subsequent steps (pitch is quantized in blocks of four pitch values, col. 41, lines 19-20), wherein the number of buffered frames of speech is increased during periods of substantially voiced speech to enable more accurate coding during the subsequent steps (pitch values buffered only for voiced frames, hence the number of buffered frames is increased, col. 41, lines 20-25).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler so that the number of buffered frames of

speech is increased during periods of substantially voiced speech to enable more accurate coding during the subsequent steps as taught by Simpson because vector quantization would achieve a lower bit rate for voiced frames compared to a scalar quantization, hence being more efficient.

Rothweiler and Simpson do not teach that the speech that is not fully voiced is synthesized using a lowpass filtered pitch periodic excitation signal mixed with highpass white noise.

Nishiguchi teaches a method for synthesizing speech that mixes a lowpass filtered pitch periodic excitation signal (voiced sound filtered by post-filter, col. 10, lines 40-44) with a highpass white noise (unvoiced section filters noise codebook vectors to combine with the pitch excitation train (Fig. 4, element 220).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler and Simpson so that speech that is not fully voiced is synthesized using a lowpass filtered pitch periodic excitation signal mixed with highpass white noise as taught by Nishiguchi because it would add white noise to voiced sections of the speech signal hence improving synthesis.

Rothweiler and Simpson do not teach speech coding using perceptual weighting.

Nishiguchi teaches the speech coder using perceptual weighting (perceptually weighted filter, Fig. 1, element 125).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler and Simpson so that the speech coder uses perceptual weighting as taught by Nishiguchi because it would lower the

quantization noise below the level of human perception hence making the system more robust.

18. As per claim 13, Rothweiler teaches

determining a gain of the speech signal (signal power, col. 7, lines 26-30),

the necessary training step includes training a Lloyd-Max quantizer with the gain values (gain quantizer uses Lloyd-max algorithm for training, col. 13, lines 30-32), and

the quantizing step includes quantizing the gain values from the training step and the gain values of those speech signals from the determining step not characterized as being substantially fully voiced in the characterizing step.(all frames are quantized, col. 13, lines 39-51).

Rothweiler, Simpson, and Nishiguchi do not teach training the quantizer with speech signals from the determining step characterized as being substantially fully voiced in the characterizing step.

However, the Examiner takes Official Notice that using only voiced speech signals in training for gain quantization is common in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler to train training the quantizer with speech signals from the determining step characterized as being substantially fully voiced in the characterizing step because it would be more important to get the gain right for voiced portions to avoid “zipper noise” due to volume variations.

19. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rothweiler in view of Simpson and in further view of Nishiguchi and Rotola-Pukkila et al. (U.S. Pat. 6,732,070).

Rothweiler, Simpson, and Nishiguchi do not teach the sampling step is performed at a variable sampling rate wherein the sampling rate is increased during periods of substantially voiced speech and decreased during other periods.

Rotola-Pukkila teaches a codec that changes the sampling rate at times when a lower complexity or higher quality is needed in the sampling (col. 11, lines 64-67 and col. 12, lines 1-2).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Rothweiler, Simpson, and Nishiguchi to vary the sampling rate as taught by Rotola-Pukkila such that the sampling rate is increased during periods of substantially voiced speech and decreased during other periods because voiced speech needs higher quality than unvoiced speech, hence needing a higher complexity to represent the signal, to avoid artifacts.

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Zinser et al. (U.S. Pat. 5,097,507) teaches a system that uses a Lloyd-Max quantizer in a speech coder. Chen (U.S. Pat. 5,745,871), Aguilar et al. (U.S. Pat. 6,691,082), and Crochiere et al. (U.S. Pat. 4,184,049) teach speech vocoders that use pitch and voicing information for coding.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Sked whose telephone number is (703) 305-8663. The examiner can normally be reached on Mon-Fri (8:00 am - 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Talivaldis Smits can be reached on (703) 306-3011. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MS
11/10/04

TĀLIVALDIS IVARS ŠMITS
PRIMARY EXAMINER